

Dictyostelids from Jilin Province, China, 4

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ABSTRACT—*Dictyostelium quercibrachium* and *D. crassicaule* were isolated from samples of soil collected on Changbai Mountain, Jilin Province, China. *Dictyostelium quercibrachium* represents a new record from China; and *D. crassicaule*, represents a new record from Jilin Province. Descriptions and illustrations based on these isolates are provided.

KEY WORDS—cellular slime molds, *Dictyosteliaceae*, *Mycetozoa*, taxonomy

Introduction

Dictyostelid cellular slime molds (dictyostelids), are ideal organisms for investigating problems in genetics, cytology, and developmental biology because of their unique macroscopic characteristics and life cycles. These organisms are primary inhabitants of soil and play an essential role in maintaining the balance between bacteria and other soil organisms, because they feed mostly on bacteria (Singh 1947; Cavender & Raper 1965a,b; Raper 1973, 1984). At present, about 150 species have been identified, mostly based on a traditional morphological classification system in which

dictyostelids are distributed among four genera based on differences in sorophore structure and branching patterns, but also on a new classification based on unique 18S rRNA sequence signatures (Kirk & al. 2008; Sheikh & al. 2018).

Jilin Province is situated in China's temperate zone and is characterized by a monsoon climate (Liu & Li 2014). Previously, a total of 18 dictyostelids species have been reported from Jilin Province (He & Li 2008; Liu & Li 2014, 2017; Liu & al. 2019). In this study, we report two additional species in *Dictyostelium*, one for the first time from China, and the other for the first time from Jilin Province.

Materials & methods

Samples of soil were collected on Changbai Mountain, Jilin Province in 2014. Each sample consisted of 20–30 g of soil and was placed in a sterile whirl-pack plastic bag and returned to the laboratory for isolation of dictyostelids according to Cavender & Raper (1965a), with some minor modifications outlined by Liu & al. (2019). Each isolate recovered from one of the plates was purified and cultivated for taxonomic studies, with an identification made using morphological descriptions (Raper 1984) and molecular characteristics (Sheikh & al. 2018). Life cycle stages were observed under a Zeiss Axio Zoom V16 dissecting microscope with a 1.5× objective and a 10× ocular. Sorocarps were mounted in water on slides for observation and measurements of spores, sorophores, and sorocarps using a Zeiss Axio Imager A2 light microscope mounted with 10× ocular and 10, 40, and 100× (oil) objectives. Photographs were taken with Zeiss Axiocam 506 color microscope camera. Spores from these isolates were frozen in HL 5 media (Cocucci & Sussman 1970) and stored at –80 °C in the herbarium of the Mycological Institute of Jilin Agricultural University, Changchun, China (HMJAU).

Taxonomy

Dictyostelium quercibrachium Cavender, S.L. Stephenson, J.C. Landolt & Vadell,
New Zealand J. Bot. 40: 258. 2002. PLATE 1A–D

When cultured at 23 °C on non-nutrient agar with *E. coli*, sorocarps clustered or solitary, often twisted, unbranched or branched, normally 1.9–4.5 mm long. Sorophore colorless, robust, stout, tapering from bases to tips, consisting of one tier of cells in the terminus, and becoming coremiform at the lower part when clustered and aged. Tips capitate, bases clavate to round. Branches *Quercus*-like, twisted or sometimes recurved, tapering from bases to tips, with small sori. Terminal sori white, globose, commonly 130–290 µm diam. Spores hyaline, elliptical, 4.6–7.6 × 2.9–3.9 µm. Aggregations with radiate flattened streams.

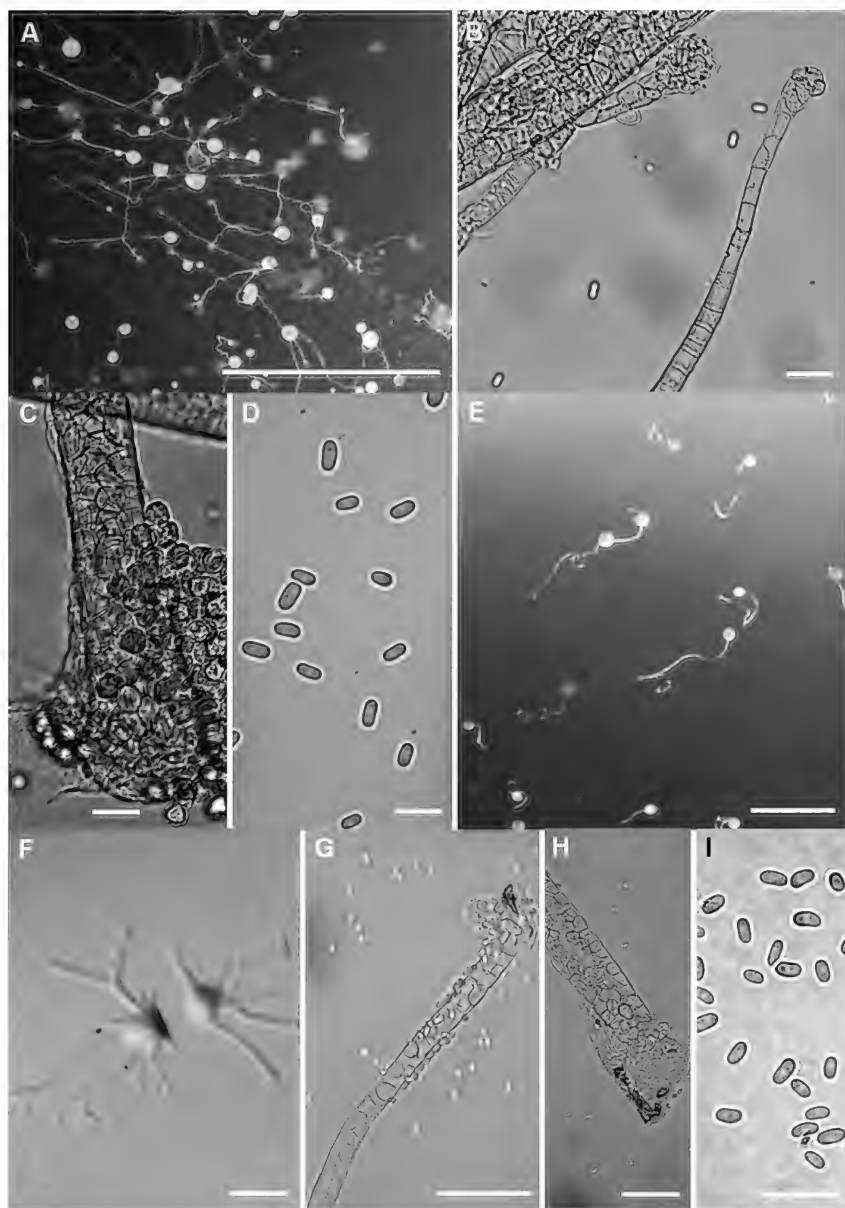


PLATE 1. *Dictyostelium quercibrachium* (HMJAU MR238): A. Sorocarps; B. Sorophore tips; C. Sorophore base; D. Spores. *Dictyostelium crassicaule* (HMJAU MR230): E. Sorocarps; F. Aggregations; G. Sorophore tip; H. Sorophore base; I. Spores. Scale bars: A = 5 mm; B, C, I = 20 μ m; D = 10 μ m; E = 1 mm; F = 200 μ m; G, H = 50 μ m.

SPECIMEN EXAMINED: CHINA, JILIN PROVINCE, Changbai Mountain, isolated from a soil sample (S4377) collected in a *Pinus koraiensis* Sieb. & Zucc. forest, 22 Aug. 2014 (HMJAU MR238).

COMMENTS: *Dictyostelium quercibrachium* was first reported from forest soil sampled in New Zealand; however, other identical isolates also have been recovered from a bog environment in north central Ohio in the United States and from Iguazú in South America, as per unpublished data (Cavender & al. 2002). The sorocarp morphology varies considerably in *D. quercibrachium* depending upon environmental conditions such as temperature and food supply.

Dictyostelium crassicaule H. Hagiw.,

Bull. Natl. Sci. Mus., Tokyo, B 10: 67. 1984.

PLATE 1E-I

When cultured at 23 °C on non-nutrient agar with *E. coli*, sorocarps solitary, unbranched, rarely prostrate, 0.3–2.3 mm long. Sorophore colorless, sinuous, stout, tapering from bases to tips, consisting of one to two tiers of cells near the tip, bases round or conical sometimes with basal discs, tips capitate. Sori white, globose, commonly 40–230 µm diam. Spores hyaline, oblong to elliptical, 5.7–7.0 × 3.4–3.9 µm, usually without (but sometimes with) irregular polar granules. Aggregations with radiate streams.

SPECIMEN EXAMINED: CHINA, JILIN PROVINCE, Changbai Mountain, isolated from a soil sample (S4372) collected in an alpine birch forest, 22 Aug. 2014 (HMJAU MR230).

COMMENTS: *Dictyostelium crassicaule* was originally isolated from soil sampled in *Pinus pumila* of Chokai Mountain, Akita, Japan (Hagiwara 1984). This species is characterized by its small sorocarps, capitate tips, and thick sorophores.

Discussion

Our study increases to 20 the number of dictyostelid species known from Jilin Province. *Dictyostelium quercibrachium*, which was first reported from New Zealand in the Southern Hemisphere (Cavender & al. 2002), is new to China (here reported from a *Pinus koraiensis* forest) and is currently recorded only from Jilin and Heilongjiang provinces in China. Further dictyostelid surveys will probably increase species richness in Jilin Province.

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